Relationships between Photic Driving, Nicotine and Memory

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In the present study an attempt is made to converge and harmonize three sets of observations. The first focuses on the reported enhancement effect of nicotine on initial learning, immediate memory and on the consolidation process underlying long-term memory. It is well established that nicotine excites electrocortical arousal, indicated by EEG desynchronisation, decreased EEG amplitude and increase in dominant alpha frequency. These effects are attributed to a secondary release of acetylcholine following stimulation of nicotinic receptors in the mesencephalic reticular formation. Further evidence suggests that the cellular layers of the hippocampus, an organ implicated in attentional and memory processes, are a specific target for nicotine. The second set relates to evidence published in the Soviet literature relating certain parameters of the Photic Driving (PD) response to efficiency of incidental and intentional memory, both short- and long-term. The third set refers to studies investigating the effect of nicotine on PD efficiency, which have thrown up conflicting results, and studies reporting that nicotine improves critical flicker fusion (CFF), a measure which correlates highly with PD efficiency. The experiment involved the measurement, using a repeated measures design, of PD power at 14 frequencies across 16 EEG sites, and measurement of immediate recall of passages of discursive prose (Rivermead Test), in 40 subjects under 4 nicotine conditions. Results showed significant relationships between high frequency PD power and memory, between nicotine dose and PD power, and between nicotine dose and efficiency of recall, all in the predicted directions. Implications of these findings are discussed.

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